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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

MAILED

SEP 25 2007

Technology Center 2100

Application Number: 10/045,717
Filing Date: October 19, 2001
Appellant(s): KOMPELLA, KIREETI

Kelly Patrick Fitzgerald
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 06/11/2007 appealing from the Office action mailed 01/12/2007.

### *(1) Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

### *(2) Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

### *(3) Status of Claims*

The statement of the status of the claims contained in the brief is correct.

### *(4) Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

### *(5) Summary of Claimed Subject Matter*

The summary of claimed subject matter contained in the brief is correct.

### *(6) Grounds of Rejection to be Reviewed on Appeal*

The appellant's statement of the grounds of rejection to be reviewed on appeal in the brief is correct.

### *(7) Claims Appendix*

The copy of the appealed claims contained in the Appendix to the brief is correct.

### *(8) Evidence Relied Upon*

| | | |
|---|---|---|
| US 6618760 B1 | Aramaki et al. | 09-2003 |
| US 6857026 B1 | Cain | 02-2005 |

*(9) Grounds of Rejection*

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 1-2, 5-6, 12-14, 16-18, 22-23, 28-31, 37 and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Aramaki et al. (US 6618760 B1), hereinafter referred as Aramaki.

a. Regarding claim 1, Aramaki disclosed a method comprising: storing, within a network router, a forwarding tree (column 1, lines 27-31: router, forwarding destination; column 2, lines 1-6: various retrieving method, binary tree retrieving method) having a set of nodes, wherein nodes include leaf nodes that correspond to destinations within a computer network (column 2, lines 1-14: method of retrieving the next forwarding destination, binary tree retrieval method, registered IP addresses are formed in tree structure, nodes forming the tree correspond to bit values of the bit string); storing, external to the forwarding tree, next hop data representing network devices neighboring the network router (column 5, lines 48-67: retrieving a hop pointer from a retrieval table; first tables are hierarchically arranged according to division of the destination address; second table includes a hop pointer and first-table pointer; a hop pointer is read from a finally accessed entry of the second table as a retrieval result); storing, within the leaf nodes of the forwarding tree, indirect next hop data that maps the leaf nodes of the forwarding tree to the next hop data, wherein at least two different ones of the leaf nodes of the forwarding tree contain indirect next hop data that references the next hop

data for the same neighboring network device (column 1, lines 50-57: IP address of the retrieval key is "001...", "00*" is the longer in prefix length ..., "00*" is selected as the IP address of the next forwarding destination; column 5, line 41-column 6, line 3: hop pointers indicating next forwarding destination stored in second table); identifying a key within a network packet (column 1, lines 27-31: IP address as a retrieval key); traversing a subset of the nodes of the forwarding tree within a network device by testing at least one bit of the key per each of the traversed nodes, wherein values of the tested bits in the key determine a path traversed along the forwarding tree until reaching one of the leaf nodes of the forwarding tree (column 1, line 50-column 3, line 43: binary tree and radix tree retrieval methods); upon reaching a leaf node of the traversed path, using the indirect next hop data within the leaf node of the traversed path to select a next hop form the next hop data external to the forwarding tree (column 6, line 17-column 7, line 10: retrieve hop pointer), and forwarding the packet to the selected next hop (column 1, lines 14-20: forward an incoming data signal such as an IP packet to a communication network).

b. Regarding claim 2, Aramaki disclosed the method of claim 1, wherein the forwarding tree comprises a radix tree (column 2, line 14-40).

c. Regarding claim 5, Aramaki disclosed the method of claim 2, wherein storing the indirect next hop data comprises storing a data pointer within each of the leaf nodes that references the next hope data external to the forwarding tree (column 5, line 48-column 6, line 16: hop pointer).

d. Regarding claim 6, Aramaki disclosed the method of claim 1, wherein storing the next hop data comprises storing an array of next hop data elements external to the forwarding tree (column 5, line 41-column 6, line 3: hop pointers indicating next forwarding destination stored in second table, thus the next hop data is stored outside the first and second tables).

e. Claims 12-14 and 16 are of the same scope as claims 1-2 and 5-6. These are rejected for the same reason as for claims 1-2 and 5-6.

f. Claims 17-18 and 22-23 are of the same scope as claims 1-2 and 5. These are rejected for the same reason as for claims 1-2 and 5.

g. Claims 28-31 are of the same scope as claims 1-2 and 5-6. These are rejected for the same reason as for claims 1-2 and 5-6.

h. Claims 37 and 40 are of the same scope as claims 1-2. These are rejected for the same reason as for claims 1-2.

Aramaki disclosed all limitations of claims 1-2, 5-6, 12-14, 16-18, 22-23, 28-31, 37 and 40. Claims 1-2, 5-6, 12-14, 16-18, 22-23, 28-31, 37 and 40 are rejected under 35 U.S.C. 102(e).

2. Claims 3-4, 7-11, 15, 19-21, 24-27, 32-36, 39 and 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aramaki et al. (US 6618760 B1), hereinafter referred as Aramaki, and further in view of Cain (US 6857026 B1), hereinafter referred as Cain.

a. Regarding claim 3, Aramaki disclosed the invention substantially as claimed. Aramaki does not explicitly disclose storing a primary next hop reference and a backup next hop reference.

b. Cain shows (column 4, line 12-56) specifying a preferred route and alternate route in an analogous art for the purpose of using alternate routes for fail-over in a communication network.

c. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify Aramaki's functions of using radix tree and hop pointer in setting up a routing table for retrieving routes with Cain's functions of using alternate routes for fail-over in a communication network.

d. The modification would have been obvious because one of ordinary skill in the art would have been motivated to have multiple routes per Cains' teaching in setting up routing table per Aramaki's teaching to enhance the availability with either multiple network interfaces or different next hop devices (column 4, lines 42-55).

e. Regarding claim 4, Cain shows further comprising routing packets to the backup next hop in response to a network event (column 3, line 38-49: node failure; column 4, line 30-41: failure of link).

f. Regarding claim 7, Cain shows further comprising: receiving a packet comprising network update information (column 5, line 51-63: control message for the route maintenance logic to determine the status of various routes); and modifying the next hop data external to the forwarding tree in response to the network update information without modifying the forwarding tree (column 5, line 19-28 and 42-50: determine and update the availability and priority of routes).

g. Regarding claim 8, Cain shows further comprising: storing routing information within a routing engine, wherein the routing information represents routes within a network (column 5, line 9-29: routes for routing protocol messages; column 5, and 42-50: route computation and maintenance logic); and storing the route data, the indirect next hop data and the next hop data within a packet forwarding engine (column 5, line 9-29 and 42-67: route availability and priority).

h. Regarding claim 9, Cain shows further comprising: receiving a packet comprising network topology update information (column 1, line 29-37: link state routing protocol; Fig. 2, item 204: multiple route information; column 4, line 66-column 5, line 8: multiple route, priority, preferred and alternate route information; column 5, line 29-41: route computation logic computes routes for destinations by running multiple routing protocols and computes routes); updating the routing information within the routing engine (Fig. 2, item 210: install route; column 2, line 7-10: update the availability, priority of routes, compute new routes; column 4, line 66-column 5, line 8: obtain, prioritize and install route; column 5, 19-28 and 42-50: route computation logic computes routes for destinations by running multiple routing

protocols and computes routes); and issuing a message from the routing engine to direct the packet forwarding engine to modify the next hop data in response to the network update information (column 3, line 11-20: link state routing protocol; column 5, line 51-63: routing logic receives control messages and forward to maintenance logic).

i. Regarding claim 10, Cain shows wherein storing the routing information includes storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine (column 5, line 9-29 and 42-67: routing table).

j. Regarding claim 11, Cain shows wherein storing the routing information includes storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine, and issuing the message comprises analyzing the copy to identify the next hop for modification (Fig. 2; column 4, line 66-column 5, line 67: computation logic computes routes for destinations by running multiple routing protocols and computes routes).

k. Claims 15 and 19 are of the same scope as claim 3. These are rejected for the same reasons as for claim 3.

l. Regarding claim 20, Cain shows wherein some of the next hop data represents software modules for processing data packets (column 6, linl 1-18).

m. Regarding claim 21, Cain shows wherein each of the software modules is selected from one of a packet filter, a policy enforcer and a packet counter (column 4, line 12-29).

n. Claims 24-27 are of the same scope as claims 1, 8-9 and 11. These are rejected for the same reasons as for claims 1, 8-9 and 11.

o. Claims 32-36 are of the same scope as claims 1, 7-9 and 11. These are rejected for the same reasons as for claims 1, 7-9 and 11.

p. Claims 39 and 41-44 are of the same scope as claims 1, 3, 5 and 7-8. These are rejected for the same reasons as for claims 1, 3, 5 and 7-8.

Together Aramaki and Cain disclosed all limitations of claims 3-4, 7-11, 15, 19-21, 24-27, 32-36, 39 and 41-44. Claims 3-4, 7-11, 15, 19-21, 24-27, 32-36, 39 and 41-44 are rejected under 35 U.S.C. 103(a).

*(10) Response to Argument*

In response to Appellant's argument on claim 1-2, 5-6, 12-14, 16-18, 22-23, 28-31, 37 and 40 rejections under U.S.C. 102(e) as per under the heading of First Ground of Rejection under Appeal on page 7 current Appeal Brief Filed:

1. Appellant has argued (2nd paragraph on page 12) that nothing in Aramaki teaches or suggests storing a forwarding tree having a set of nodes, and storing, external to the forwarding tree, next hop data representing network devices neighboring the network router. Aramaki has shown (column 5, lines 46-67) that first tables are hierarchically arranged according to division of destination address, i.e. nodes in levels (hierarchs) per routing destination addresses; a second table indexes into the first tables, i.e. providing pointer among levels of nodes; first table contains pointers to the entries in the second table; traverses through first tables until a hop pointer, i.e. indirect hop data" is reached in the second table. Thus hierarchical nodes (entries in first tables) are connected with pointers (entries in second table); a forwarding (routing) tree is established and next hop data (hop pointer) is in the second table. Aramaki has further shown (column 1, lines 27-32) that a router is to retrieve routing information from a retrieval table by using IP address indicating the ultimate destination of the incoming IP packet signal as a retrieval key, i.e. IP packet destination address, and determines a forwarding destination such as an output interface. Thus, it is clear that Aramaki does have the limitation of "next hop data representing network devices neighboring the network router".

2. Appellant has argued (1st paragraph on page 14) the limitation of "identifying a key and traversing a subset of the nodes of the forwarding tree ..." As one skill in the art can

see the first tables per Fig. 7 of Aramaki are used in traversing IP address bits (31-24), (23-16), (15-8) and (7-0) in a bitwise matching process through first tables for determination of next tree level pointer, i.e. second table entry, stored in first tables or a hop pointer. Thus Aramaki has shown a bitwise comparison for IP address indexing in a first table entry for second table entry to index into another first table entry (different level) and traversing through up to 4 levels of first table nodes for a hop pointer.

3. Appellant has argued (1st paragraph on page 15) the limitation of "at least two different ones of the leaf nodes of the forwarding tree contain indirect next hop data that references the next hop data for the same neighboring network device". Aramaki has shown (column 1, lines 50-57) that IP address of the retrieval key is "001…"; "00*" is the longer in prefix length …; thus "00*" is selected as the IP address of the next forwarding destination and (column 5, line 41-column 6, line 3) hop pointers indicating next forwarding destination stored in second table. This is to say multiple IP destination addresses may match to the same output interface as denoted by the next forwarding destination (column 1, lines 27-32). This is further apparent from Fig. 3 where P5 is for all "00*" and "01*" and P2 is for all "11100*", "11101*", "11110*" and "11111*". Thus multiple first table entries may point to the same hop pointer, i.e. a next forwarding destination.

4. Appellant has argued (4th paragraph on page 15) on the limitation of "upon reaching a leaf node of the traversed path, using the indirect next hop data within the leaf node of the traversed path to select a next hop form the next hop data external to the forwarding tree", Aramaki has shown (column 6, line 17-column 7, line 10) retrieving hop pointer;

and as per item 1 above Aramaki has shown (column 1, lines 27-32) that a router is to retrieve routing information from a retrieval table and determine a forwarding destination such as an output interface. It is further shown by Aramaki (column 2, line 65-column 3, line 4) a next table pointer indicating the IP address of next forwarding destination and transmission interface information.

5. Appellant has argued the claim 24 rejections under 35 U.S.C. 103(a). Appellant's arguments seem to be based upon the related claim 8 that depends upon claim 1. Thus the above responses with respect to claim 1 should applicable to appellant's arguments with respect to claim 24.

In response to Appellant's argument on claim 3-4, 7-11, 15, 19-21, 24-27, 32-36, 39 and 41-44 rejections under U.S.C. 103(a) as per under the heading of Second Ground of Rejection under Appeal on page 16 current Appeal Brief Filed:

1. Appellant has argued that Cain is on primary and backup routes rather than claim 3, 15 and 19 language on primary and backup hops. Cain has shown (column 4, line 12-56) prioritizing a preferred route and alternate route associated with different next-hop devices but over the same network interface. Thus Cain has shown routing through the same network interface where there are two different next-hop devices.

2. Appellant has argued that Cain's modification of network routes would modify the forwarding tree with respect to claim 7, 32 and 41 language. As per item 1 above, Cain has shown being able to prioritizing a preferred route and alternate route associated with different next-hop devices but over the same network interface. Thus, the forwarding-tree is not changed but the information on next-hop devices on the same network interface.

3. Appellant has argued that Cain does not have a packet forwarding engine as per claims 8, 33 and 42. As one skill in the art would know that a router would have a forwarding engine as Cain has shown (column 5, lines 29-67) a routing logic working with network interfaces in forwarding messages according to a routing table.

4. Appellant has argued that one skill in the art would not be motivated to modify Aramaki to include Cain's function of updating routing information as per claims 9, 25, 34 and 43. Aramaki has shown (column 4, lines 42-55) new required information to be sent to the next forwarding destination is added, the added information including transmission interface information is set in every registrable entry. Cain has shown (Fig. 5; column 5, lines 29-67) router including routing logic, route maintenance logic, route computation logic and routing table. Both Aramaki and Cain are in the art of setting and updating routing functions.

Additional arts are identified and disclosed in office action dated 07/10/2006, including:

a. Medard et al. (US 6047331 A) Method and apparatus for automatic protection switching
b. Hariguchi et al. (US 6665297 B1) Network routing table
c. Marques et al. (US 6643706 B1) Scaleable route redistribution mechanism

***(11) Related Proceeding(s) Appendix***

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Peling A Shaw pas

August 30, 2006

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